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Specification of sustainability-based environmental assessment decision criteria and implications for determining "significance" in environmental assessment

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Chapter 1: Introduction

Purpose and Background

Sustainability and significance

This research project has an immediate objective that lies within a broad task. The immediate objective is to prepare a foundation for guidelines on how to understand and apply the concept of environmental significance in assessments that adopt sustainability-based decision criteria. This would be easy if we had a well-established understanding of what adopting sustainability-based decision criteria might entail generally for environmental assessment in Canada. Unfortunately, no such understanding exists.

Many versions of sustainability-based decision criteria have been proposed for implementation by national, provincial, regional and municipal authorities, development agencies, progressive corporations, financial institutions, non-government organizations and private individuals. Quite a few have been, in various ways, applied. Some of the applications have even been in environmental assessment processes and similar mechanisms for open and anticipatory deliberation. But so far, most of these sustainability applications have responded to the peculiar demands of case and jurisdiction. While there has been much advocacy of consistent attention to sustainability in environmental assessment, we are just beginning to consider how best to do it.

In contrast, determining significance has been a long standing subject of attention in environmental assessment theory and practice. But while it has been examined with some care for many years by many authorities, these deliberations and experiments have generally not involved applications where contribution to sustainability was the goal. Usually, the significance of undertakings and their effects has been considered in environmental assessments focusing narrowly on avoidance or mitigation of unacceptable biophysical effects. Consequently, the relevant deliberations have concentrated on how to determine which specific predicted adverse effects are truly significant and what mitigation measures may be sufficient to reduce the effects below the significance threshold. Lessons from such applications are helpful. But where environmental assessment focuses on positive contributions to sustainability, the significance issues are different.

While the meaning and implications of "sustainability" have been interpreted in many ways, there is broad agreement on basic components that have important implications for environmental assessment design and practice. For example, sustainability considerations clearly include socio-economic as well as biophysical matters and are especially concerned with the interrelations between and interdependency of the two. That means that human as well as ecological effects must be addressed and that these two must be considered as parts of large complex systems. Also, adopting contributions to sustainability as a key objective and test in environmental assessment clearly implies that minimization of negative effects is not enough. Assessment requirements must encourage positive steps – towards greater community and ecological sustainability, towards a future that is more viable, pleasant and secure.

Environmental assessment processes – at the strategic as well as project-level and in various kinds of public and private sector planning exercises as well as in formally legislated and labelled environmental assessment regimes – are among the most promising venues for application of sustainability-based criteria. They are anticipatory and forward looking, integrative, often flexible, and generally intended to force attention to otherwise neglected considerations. But

few environmental assessment processes today are well designed for addressing human and as ecological effects within complex systems. Similarly, few emphasize attention to maximizing positive long term improvements. Adoption of sustainability-based decision criteria therefore entails more or less profound rethinking of many aspects of environmental assessment design and implementation. Implications for defining "significance" are part of this larger story.

Pressures for a shift to sustainability-based decision criteria

Considering these implications of a shift to sustainability-based decision criteria, and figuring out how to respond, is now an imperative in Canada and elsewhere. There are several reasons for this.

For the federal government, the immediate pressures come from the work of two recent environmental assessment review panels established under the *Canadian Environmental Assessment Act* (*CEAA*). In the Voisey's Bay Mine and Mill case (a joint panel) and the Red Hill Valley Expressway (exclusively *CEAA* panel) case, panel guidelines for environmental impact statements required the proponents involved to provide evidence that their undertakings would make a positive contribution to sustainability and respect the precautionary principle.[1] The panels' actions rely on interpretations of *CEAA* that may be debatable in law. But they are consistent with the purposes of the legislation (especially *CEAA* section 4(b)) and with the general evolution of environmental assessment thinking and practice towards being more comprehensive, integrated and ambitious.[2]

These panels' insistence on a sustainability test fits well with the criteria applications of other ground-breaking review bodies.[3] It is also consistent with a variety of other federal government steps to ensure more effective implementation of its commitments to sustainability. These include the following initiatives:

- the 1995 amendments to the *Auditor General Act*, which created the position of Commissioner of the Environment and Sustainable Development and required federal departments to prepare sustainable development strategies covering their activities;
- *The 1999 Cabinet Directive on the Environmental Assessment of Policy, Plans and Program Proposals*, which obliges departments to consider positive as well as negative environmental effects at the strategic level (in the development of policies, programmes and plans, etc.) and to link environmental assessment at this level to the implementation of their sustainable development strategies;[4]

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1 See sections 3.3 and 3.4 of the "Environmental Impact Statement Guidelines for the Review of the Voisey's Bay Mine and Mill Undertaking" issued by the Voisey's Bay Mine and Mill Environmental Assessment Panel on 20 June 1997, and section 3.1 along with annex 4, section 1.0, of the "Environmental Impact Statement Guidelines for the Review of the Proposed Red Hill Creek Expressway North-South Section Project" issued by the Red Hill Creek Expressway Review Panel on 15 October 1999.

2 See Robert B. Gibson, "Favouring the Higher Test: contribution to sustainability as the central criterion for reviews and decisions under the *Canadian Environmental Assessment Act*," *Journal of Environmental Law and Practice* 10:1 (2000), pp. 39-55.

3 One example is the federal-provincial review panel that examined the moratorium on hydrocarbon exploration on Georges Bank. See Georges Bank Review Panel (1999), *Georges Bank Review Panel Report* (Ottawa/Halifax: Natural Resources Canada and Nova Scotia Petroleum Directorate, June 1999), esp. pp.51-56.

4 Canada, *The 1999 Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*, (Ottawa: Minister of Public Works and Government Services Canada and Canadian Environmental Assessment Agency, 1999).

- efforts involving the Canadian International Development Agency to design appropriate assessment rules for development assistance projects in an international context wherein bilateral as well as multilateral aid bodies face growing expectations for project decision making with explicit attention to sustainability contributions; and
- moves by several departments to develop strategic level "sustainability assessment" processes, providing more or less integrated attention to social, economic and ecological considerations.

In effect, adoption of sustainability-based decision criteria for environmental assessment is happening at the federal level in Canada, both within and outside the legislated process.

Similar and, in some cases, stronger pressures for effective adoption of sustainability-based decision criteria are evident in the provinces and territories. Perhaps the most specific and forceful step was the recent court decision concerning application of the British Columbia *Environmental Assessment Act* (*EAA*) in the case of the proposed reopening of the Tulsequah Chief mine on the Taku River.

The Taku River Tlingit First Nation argued that the assessment of the proposed project had not given due attention to sustainability effects on the Tlingit. In her ruling, Madam Justice P.A. Kirkpatrick quashed the provincial government ministers' approval of the proposed project in part because of failure to respect the first purpose of the *Act* (s.2(a)), "to promote sustainability by protecting the environment and fostering a sound economy and social well-being." Madam Justice Kirkpatrick stated:

> ... it is clear that the Ministers' reasons demonstrate that the statutory obligation to promote sustainability, an object of the EAA, was not fully addressed. In this regard, I conclude that the Ministers' obligations under the statute and at common law were not fulfilled.[5]

British Columbia's Environmental Assessment Office is now leading a multistakeholder initiative to develop sustainability criteria for that case, and may well need to consider developing sustainability criteria for other applications as well. Because the British Columbia legislation provides for both strategic and project level assessments, the applications potentially involved could cover a very broad range.

Other jurisdictions with sustainability as an explicit or even implicit legislated assessment purpose may face similar obligations. Québec, for example, already has brief generic guidelines requiring attention to "les objectifs du développement durable" including consideration of positive as well as negative effects and integration of social, ecological and economic dimensions.[6]

Clearly for several Canadian jurisdictions, careful evaluation of the implications of a commitment to sustainability in assessment, for matters such as determining significance, is timely if not overdue.

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[5] Taku River Tlingit et al. V Ringstad et al., 2000 BCSC 1001, 28 June 2000, Reasons for Decision, paragraph 135.

[6] The Québec Ministry of Environment has issued generic sectoral impact study guidelines (directives) for different types of projects. All have a common section on sustainable development (dévelopement durable). See http://www.menv.gouv.qc.ca/programmes/eval_env/industr.rtf

The role of this report

In response, this report is an initial attempt to clarify the practical implications of adopting "sustainability" as the central decision criterion in environmental assessment in Canada, with special attention to the particular question of how consideration of "significance" may be affected.

For the purposes of this work, "environmental assessment" is defined broadly to include processes applying to the preparation and approval of policies, plans and programmes (strategic level assessments) as well as those applying to projects and project-level activities. One of the defining challenges of environmental assessments of undertakings in this broad range has been determining the "significance" of undertakings, options, concerns, uncertainties and effects. This is in part because dealing with the significance problem so often involves addressing the difficult conjunctions of knowledgeable understanding and value-laden choice – the human and the ecological, the systemic and the particular, and the positive and the adverse – that are the most important and perplexing aspects of environmental assessment work. Implications for the significance problem therefore serve well to illustrate how a shift to sustainability-based criteria will affect environmental assessment practice generally.

The basic working assumption underlying this research has been that a shift to sustainability-based environmental assessment decision criteria amounts to a fundamental resetting of purposes and priorities. Inevitably, this will affect many aspects of assessment design and implementation. The implications for significance considerations are only part of the story. The immediate purpose here is to build the foundation for a guidance document for considering significance in a working sustainability-based framework for environmental assessment. Much of the initial focus must be on how to construct the framework.

The research team for this project has, therefore, attempted to build an understanding from the basics. We have gone back to the roots of the concept of sustainability and we have examined the range of sustainability interpretations and implementations, in Canada and elsewhere, to see what core of agreement there is on the principles, processes and methodologies to be applied. We have surveyed how sustainability objectives have already been integrated into environmental assessment processes in various progressive jurisdictions and we have examined how significance in particular has been addressed. The results of that work are reported in three separate background papers.

- Background Paper #1, *Sustainability Theory, Application and Evaluation*, prepared by Graham Whitelaw, Robert Gibson, Selma Hassan, James Tansey, Lorri Krebs and Doris Pokorny
- Background Paper #2, *The Treatment of Sustainability in the Project-Level Environmental Assessment, Strategic Environmental Assessment and Development Programme Approval Processes of Ten Jurisdictions*, prepared by Jenna Watson and Jennifer Agnolin
- Background Paper #3, *Significance in Environmental Assessment*, prepared by David Lawrence.

Drawing from these background documents and other sources, this synthesis paper will outline the key principles and process rules entailed by adoption of sustainability, identify the main implications for application to environmental assessment design, and illustrate this with special attention to the significance problem. The paper concludes with a review of the main problems still to be resolved and, where evident, the most promising possible solutions or route to solutions.

This paper is certainly not meant to be the last word even on the general framework for applying sustainability-based criteria in environmental assessment. It was initially prepared as a discussion paper for a workshop with environmental assessment and sustainability experts held at the University of British Columbia in June 2001. The paper was revised substantially after that workshop. Even so, it remains a work in progress. For as we shall see, very little about pursuing sustainability is simple and perhaps nothing is final.

The basic challenge

Decision criteria are the basic rules of the game. Effective application of sustainability-based criteria in environmental assessments will entail at least some clarity about what the effective criteria are and how they are to be interpreted. Policy-makers and process designers have sometimes embraced vagueness as a means of preserving discretionary flexibility and contextual adjustability. Constructive ambiguity can also be helpful in keeping representatives of competing interests at the table. But vagueness is maintained at a cost. While participants in environmental assessments – proponents, intervenors, administrators and decision makers – will appreciate the need to adapt assessment obligations to suit different undertakings, locales and expectations, reinventing the rules for every specific case is likely to bring intolerable uncertainty and unduly attenuated deliberation.

The basic challenge then is to determine what rules, what more specific decision criteria, can be identified for generic application, and what generic processes can be designed for reasonably effective, efficient and fair elaboration of detailed criteria and other decision making in individual cases. For sustainability assessments of proposed new undertakings at the project or strategic levels, the key issues will inevitably surround what factors must be addressed (e.g. social, economic and ecological effects, positive and negative, specific and cumulative, immediate and long term, proximate and distant, etc.), how they are to be aggregated (so the forest is considered along with the trees), and how the individual and joint effects are to be evaluated and compared for the purposes of defending claims of net contribution to sustainability.

The sustainability literature and adjacent work have much more to say about what factors to address for sustainability purposes than about how to aggregate, evaluate and compare the findings. Beyond a few specific topics, there has been little careful discussion of possibly acceptable tradeoffs between positive contributions in some areas and negative effects in others. It is not clear whether this is wise or unrealistic or both. But clearly this is a matter that must be faced in most practical attempts to use sustainability-based criteria in environmental assessment. Accordingly it will be a focus of consideration in this report.

The first step, however, will be to review the record of thinking and practice on sustainability and to identify the broadly accepted principles that could be adopted as the basis for initial clarification of sustainability implications for environmental assessment decision making.

Chapter 2: Sustainability

Origins

Over the last decade and a half, the concept of "sustainable development" or "sustainability"[7] has been widely, if ambiguously, embraced in jurisdictions around the world. There has been much debate about the meaning and implications of the concept, and much criticism of the actual behaviour of institutions that have claimed devotion to it. Nevertheless, the great diversity of theoretical formulations and applications has proved to be underlain by an essential commonality of shared concerns and principles. And the early official commitments in rhetoric have gradually been expressed in law and policy, to the point where we now can and must begin to specify more clearly the meaning and implications for practical use.

Sustainability emerged as three things: a critique, a set of principles implying positive objectives, and a focus for strategies for change. It gained worldwide attention chiefly through the work of the World Commission on Environment and Development (the Brundtland Commission), which was assigned to address two intractable and apparently conflicting problems. Continuing environmental degradation was leading not only to local and regional resource depletion and damage to essential ecological functions, but also to cumulative global effects. At the same time, the general failure of development initiatives in many places was leaving many people in destitution and insecurity while the gap between rich and poor deepened.. These dynamics, combined with a continuing rise in human numbers, pointed to an ugly future of increasingly desperate poor people with little choice but to eat into their remaining natural capital – in a world which apparently could not support everyone at even a moderate European standard with current levels of technological and distributional efficiency.

In this context, sustainability as a proposed solution was necessarily an attack on conventional thinking and practice. Sustainability's proponents recognized that it would eventually be suicidal to allow a further undermining of ecological life support systems, locally and globally. At the same time, they saw that development is required to eliminate destitution, ensure material security, and allow individuals and communities more choices and more power to exert greater control over the factors affecting their lives. Together, development with sustainability demanded initiatives designed and pursued in ways that would protect resources and ecological integrity over the long term while greatly improving human well-being, especially among the poor.

Just how this is to be accomplished has been and continues to be a matter of debate. The Brundtland Commission emphasized giving poorer countries better access to markets in wealthier nations, using a variety of mechanisms to encourage much greater efficiency in material and energy use, and providing some encouragements for greater economic and political equity. Others since then have adopted different perspectives and proposed different priorities and pathways. A great deal of valuable work has been done to understand better how ecosystems work and how their integrity may be sustained. Similarly admirable efforts have gone into designing and applying more promising ways of fostering efficiency and equity, of helping communities build their on own social and material resources to establish sustainable livelihoods, of addressing problems

[7] For the purposes of this paper, the two terms are synonymous. The terms have been used differently and there has been much debate about whether and how the usages have differed. But these debates are unresolved and there is not even much agreement on which term is broader. The literature and practice review reported in Background Paper #1 covers both "sustainable development" and "sustainability" discussions and applications. This paper will similarly use the term "sustainability" to cover both. "Sustainability" is preferred here solely because it is shorter.

with inter-generational implications, of identifying appropriate indicators of human and ecological well-being for all sorts of communities and ecosystems, and of understanding how to design for and adapt to continuing uncertainties (see Background Paper #1).

Now, nearly 15 years after release of the Brundtland Commission's report, there is a huge body of theory and practice from which to draw and while it is diverse in emphasis and approach and sometimes contradictory on important specifics, there is essential consistency on some basic components.

Pillars

Much of the sustainability literature attempts to construct an understanding of sustainability on a number of pillars, which are recognized to be interconnected and interdependent, but which reflect more or less conventional modern disciplinary categories. Some advocate a two pillar version (ecological and socio-economic); others three (ecological, social, economic), or five (ecological, social, economic, cultural, political), and so on.

The two pillar version reflects the environment and development concerns of the Brundtland Commission. It is also sometimes favoured by environmentalists who wish to stress that ecological concerns are at least equivalent to human ones. The three pillar version distinguishes between economic and social needs, in part to emphasize that material gains are not sufficient measures or preservers of human well-being. Similarly, the addition of particular attention to cultural and political components, most common in international development applications, is meant to stress the importance of these factors in building change that may be viable over the long haul.

But all this is essentially about emphasis. The key message of the Brundtland Commission, and of countless other serious deliberations about the prospects for human life on this planet, is that human and ecological well-being are effectively interdependent. However many layers of artifice we may construct, humans are ultimately and unavoidably dependent on biospheric conditions that are friendly to human life. And humans now play a huge role in manipulating biospheric conditions. Consequently, there is no serious strategy for preserving and enhancing ecosystem integrity that does not also involve improving human well-being.

The "deep green" depiction of the inevitable relationship between human cultures and the biosphere is a series of concentric circles – with the circle of economy inside the circle of society, which is in turn inside the circle of ecology. This is not the dominant way of seeing the world in cultures where the economy appears to rule. But it is, arguably, the way things really are. The implication is that anything in the smaller circles that undermines the larger is weakening its own foundation.

More conventionally, the sustainability literature presents intersecting circles, with the number of circles reflecting the number of pillars. Here too, contributions to sustainability are asserted only in the area of intersection, only where the human and ecological imperatives coincide.

In these depictions, the role of the pillars, or circles, is to identify areas where damage must always be avoided and improvements always sought. Thus the five pillar or five circle version implies that to contribute to necessary changes, any broad agenda for sustainability must seek positive effects on ecological, social, economic, cultural and political conditions. At least, the sustainability agenda must seek positives in general and over the long term. Persistent negative effects in any one area mean that the potential for sustainability is being compromised.

This approach begs questions about what counts as a benefit in each category. It may also provoke doubts that we must necessarily always ensure that there are no negative effects of any kind, as well as doubts that we are often able to predict effects, positive or negative, with adequate reliability for the purpose. These are serious matters, to be considered more carefully below.

Nevertheless, the clearly predominant view in the sustainability literature is that sustainability must be pursued in a world of linkages and interdependencies. Threats to human and ecological well-being are woven together in mutually reinforcing ways. So too, then, must the corrective actions be woven together – to serve multiple objectives and to seek positive feedbacks in complex systems.

While it does not follow from this that all factors must be positive for all undertakings, justification of negatives looks like an uphill climb. Unfortunately, in the real world outside the sustainability literature, there is a common, indeed deeply entrenched opinion that the economic pillar and the ecological pillar are foundations of warring houses. As a result, adopting a pillar-based approach to sustainability tends to focus attention on competing objectives, rather than on needs and opportunities for positive accommodations of interrelated human and ecological interests.

We have therefore chosen here to propose a slightly different approach – one that avoids constructing the edifice of sustainability criteria on the conventional pillars, however numerous.

The alternative, which is perhaps only superficially different from the pillar approach, is to begin not with categories based on the usual general areas of concern (ecological, social, etc.) but with a list of the key changes needed in human arrangements and activities if we are to move towards long term viability and well-being.

The list that follows is a synthesis of arguments drawn from the sustainability literature considered very broadly. It integrates considerations from ecological systems theory, corporate greening initiatives, growth management planning, civil society advocacy, ecological economics, community development and a host of other fields. Accordingly it is proposed tentatively. The seven points could easily be subdivided or reorganized into a dozen or a score. But they should be at least indicative of the approach proposed and the main factors to be addressed.

For the purposes of elaborating sustainability criteria for environmental assessment, we present the list of key changes here in the form of principles.

Principles

Integrity

Build human-ecological relations to maintain the integrity of biophysical systems in order to maintain the irreplaceable life support functions upon which human well-being depends.

Human well-being is utterly dependent on the integrity of biophysical systems, at every scale from the local to the global. We rely on the key life support functions of these systems, and on the resources and conditions that these systems maintain. At the same time, we are active participants in the world's biophysical systems.

The concept of the integrity of biophysical systems recognizes that the conditions and relationships involved at any scale, and between and among scales, are highly complex and dynamic. Because these systems are highly complex, we cannot hope to understand fully how they work and how they will respond to human interventions of various kinds. Because they are dynamic, we cannot hope to preserve current conditions and relationships in some fixed state. But we can try to maintain their dynamic integrity – their ability to deal with stresses and their capacity to adjust or reorganize in ways that retain key life support functions. We can, for example, work to preserve biodiversity as part of systems' wherewithal for adjusting and reorganizing themselves.

This is not just a question of taking ecosystem integrity into account in human decision making. Human activities are major components in most global systems. At least since the initial aboriginal use of fire to influence ecosystem change, our actions have been important factors in nature. Today, our intentional and unintentional influences clearly stress and alter biophysical systems, and degrade or deplete crucial resources at the global as well as regional and local scales.[8] Moreover, some of the most serious human sources of threats to global and local system integrity are expanding.

Energy and material consumption levels, waste generation including greenhouse gases, human population numbers and consequent demands for material sufficiency and luxury are now growing and are expected to continue to grow for some time, even under the most optimistic scenarios for environmentally responsible correction.

These phenomena are rooted human social systems with political, cultural and economic aspects that are just as complex, dynamic and interconnected as those of ecological systems. It makes sense to consider the integrity of human social systems – their ability to deal with stresses and their capacity to adjust or reorganize in ways that retain key life support functions. Moreover, because human and other biophysical systems are now interconnected in complex, dynamic ways, they effectively constitute one big system. Thus the challenge of maintaining system integrity applies to the whole thing as well as to the social and biophysical parts.

The situation, then, is not well depicted by diagrams of distinct but partially overlapping ecological and human spheres. The actual spheres are mutually embedded. Maintaining key life support functions therefore entails attention not just to the integrity of biophysical systems but also to the integrity of human systems and their relations with the larger biophysical world.

The current situation is not entirely gloomy. Not all human activities are undermining the integrity and potential long term viability of the whole. Not all resources are over-harvested and perhaps not all ecosystems are subject to stresses that threaten their integrity.[9] Openings for substitution and rehabilitation will permit extension of some current practices (though there is much debate about what substitutions may be reasonably expected and systemically viable, and considerable discussion about the potential adequacy of rehabilitations). And there may well be positive opportunities (as well as additional perils) that we do not yet see.

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[8] Human-induced changes to global atmospheric chemistry and the associated stressing of climatic systems are perhaps the best-recognized large scale challenges to system integrity. But soils degradation, desertification, depletion of ground water supplies and over-harvesting of critical, potentially renewable resources such as wild fisheries, are also cumulatively serious at a global scale.

[9] Arguably all ecosystems on the planet are now stressed to a greater or lesser degree by global climate changes and ozone layer depletion.

Overall, however, the big indicators suggest that we are now on the brink and that we are obliged for self-preservation as well as by prudence to pay much more attention to preserving biophysical and ecosystem integrity. The rules for this are not well understood. We know much less about biophysical systems and our influences on them than we need to know for confident prediction, intervention and manipulation. But part of the necessary response will involve reducing specific negative impacts and solving bigger individual problems (e.g. discharges of persistent toxins, mining of groundwater, and destructive over-harvesting of wild fish stocks). But as the inquiries into climate change have so clearly revealed, it is the complex interlinking of a host of ecologically insensitive human activities that is the essential problem.

In the current circumstances, then, the integrity principle entails more than just reducing human-induced stresses on ecological systems, though this is important. Maintaining the integrity of these systems and associated life support functions also entails examining the complex systemic implications of our own activities. We need to reduce the indirect and overall, as well as direct and specific, threats to system integrity and life support viability. To do this we need to adjust and reconstruct our own human systems to establish more modest, sensitive and flexible relations with the biophysical systems upon which we depend. The key for all this is acceptance that maintaining the planet's life support functions involves attention to the integrity of the human-ecological whole.[10]

Sufficiency and opportunity

Ensure that everyone has enough for a decent life and that everyone has opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity.

At least from the time of the Brundtland Commission, sustainability deliberations have involved a merging of two sets of objectives. The first involves reducing and reversing ecological degradation, especially where this threatens immediate or long term human well-being. The second centres on enhancing human development, especially for people who lack the key prerequisites for a decent life (typically those who have little or no access to basic resources and essential services, who have few if any satisfactory employment opportunities, who are especially vulnerable to disease, or who face physical or economic insecurity). The Commission recognized that the two are often linked and that ecological degradation and the problems to be addressed through human development are often linked and that the necessary solutions are interdependent.

This position is consistent with the general integrity principle outlined above. But the integrity principle by itself does not shed much light on the key qualities and functions to be sought or maintained. A first step in the necessary specification turns on "sustainable development".

[10] Many environmentalists are inclined to go beyond imperatives rooted in human self-interest. They advocate eco-centred ethics, under which preservation of ecological diversity and integrity is pursued for its own sake, or at least not just for human purposes, immediate or long term. Just where and to what extent the implications concerning maintenance and strengthening of ecological integrity would differ from those of enlightened human self-interest in the current situation is not entirely clear. But it would presumably affect any discussions about any contemplated trade-offs between ecological objectives and more directly human objectives.

The Commission defined "sustainable" development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[11] This vague definition has proven to be open to a host of interpretations. However, it captures the link between ecological and human well-being. Many jurisdictions have incorporated the Commission's definition, more or less verbatim, in laws and policies, including those establishing environmental assessment processes for evaluating proposed "development" undertakings.[12]

For assessment purposes, the two key elements in the Brundtland Commission's concept and definition are "needs" and "future generations." Both involve difficulties.

Undertakings properly subject to assessment at the strategic or project levels are typically intended to meet needs (or at least effective demand) of some sort. Whether these needs are legitimate and important is often a central issue and determining this is not easy.

There is a very long history of formal inquiry into human "needs" and associated or overlapping desires, aspirations, confusions and pathologies. It is well established as a fascinating but slippery subject. Needs evidently vary. They depend on the context of culture and ecology. Although people can be confused about their own needs, there is no easy distinction between real needs and false ones. Nor is there a clear line between essential needs and supplementary ones. Imposing one culture's view of essential or higher needs on people of another culture is at best risky. But ignoring destitution and oppression is unacceptable.

Needs must therefore be addressed, in part because there are contentious claims to be assessed and in part because destitution and oppression must be confronted. This must be done with effective appreciation of diversity and involvement of those whose needs are being addressed. Perhaps the best we can do is to recognize that in each different context, people do inevitably need what qualifies as enough for a decent life in that context. And beyond that, they need what we may very broadly call opportunity for improvement, recognizing that what qualifies as an improvement will vary and be a matter of choice.

The sustainability qualifier is that the pursuit of sufficiency and opportunity is a long term as well as an immediate imperative. Future generations will also need sufficiency and opportunity. This constrains what can be accepted as means of meeting immediate needs. It also affects the nature of appropriate decision making. Because choice is crucial, so is involvement of those whose present needs are allegedly being addressed or potentially being affected. But the interests of those not yet born are also relevant.

Future needs and their implications are clearly more difficult to define and represent. For example, uncertainties about the likely nature of coming technological developments, and their negative as well as beneficial effects, make it difficult to know what depletable current resources will be most important in the future. We can, however, confidently assume that maintenance of key biophysical systems and ecological functions will be critical, and that while some technological innovations will find substitutes for current resources others will find key new uses for these resources.

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[11] World Commission on Environment and Development (Brundtland Commission), Our Common Future (Oxford/New York: Oxford University Press, 1987), p.8.

[12] For example, one of the listed purposes of the *Canadian Environmental Assessment Act* (s.4(b)) is "to encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy." The Act defines "sustainable development" using the Brundtland Commission's formulation.

Applied to future as well as present generations, the sufficiency and opportunity principle incorporates a key tension. It recognizes the need to provide expanded economic and other goods to many people today but provides no safe justification for continued degradation of resource stocks and undermining of biophysical systems. Thus it both constrains and guides what is acceptable.

Equity

Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor.

The overall global technical and material capacity to provide material sufficiency for all is clearly not well used. Many people now live in conditions of serious material deprivation, economic insecurity, and tightly constrained opportunity because of material want, typically associated with and exacerbated by limited influence in collective decision making at all levels from the family on up. Meanwhile the gap between rich and poor is widening. According to the United Nations Development Programme, the richest fifth of the world's people consume 86 percent of all goods and services, while the poorest fifth make do with 1.3 percent.[13] Quite aside from the moral repugnance of this situation, it entails environmental abuses and breeds tensions likely to be destructive to both rich and poor sooner or later.

Part of the answer may lie in even modest redistribution of wealth. The UNDP reports, for example, that annual American spending on cosmetics is $8 billion and the estimated annual total needed to provide basic education for everyone in the world is only $6 billion. Similarly, when the annual total needed to provide clean water and safe sewers for the world's population is $9 billion, annual European spending on ice cream is $11 billion.[14] But simple redistribution is rarely effective by itself, and rarely achieved or maintained without accompanying efforts to build sustainable livelihoods that include practically available livelihood choices and the power to choose.

Significant willing redistribution from the rich and usually powerful to the less advantaged is historically uncommon, except where the recognized alternative (e.g. the threat of revolution) seemed worse. Whether the ecological and social threats arising from unsustainable inequities can be recognized as a clearly worse option is open to debate. It is also arguable that the consumptive focus of spending by the affluent often fails to contribute much to actual well-being, and that a less materially and energy intensive approach even to personal satisfactions would permit more equitable distribution and greater overall well-being for all. Again the potential for significant change in this direction is not well established. Nevertheless, it seems evident that greater material equity is needed at least to eliminate deprivation and material insecurity and probably also to reduce envy and make better use of resources and ecological capacities.

For reasons suggested above and explored further below, it also seems evident that greater material equity must be accompanied by greater political equity, in the broad sense of power to participate effectively in decision making in a context of real choices. In turn, political and material equity are best considered parts of a larger package of livelihood equity, including matters of health, valued employment, respected knowledge and community security.

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[13] UNDP, *Annual Development Report 1998* [www.undp.org/hdro]

[14] Ibid.

Finally, equity in sustainability deliberations is a matter that stretches well into the future. Insofar as we insist on long as well as short term gains in all areas, it is likely that greater inter-generational equity will result. Compromises and trade-offs (i.e. sacrifices of one or more of the constituent aspects of progress towards greater sustainability in the interests of greater gains in other areas) are acceptable only if there is good reason for confidence that the reverses will be temporary and will not have longer term effects that undermine opportunities for future generations.

Efficiency

Reduce overall material and energy demands and other stresses on socio-ecological systems.

The Brundtland Commission placed heavy emphasis on technological and economic changes that would achieve major improvements in material and energy efficiencies. This path to sustainability has been the focus of industrial advocacy. Literature and initiatives addressing private sector responsibilities concentrate on doing more with less, including optimizing production through decreasing material and energy inputs and cutting waste outputs through product and process redesign throughout product lifecycles. Such improvements would permit continued economic expansion, with associated employment and wealth generation, while reducing demands on resource stocks and pressures on ecosystems.

While there is considerable debate about what is needed, what is possible with current technologies, and what is plausible with imagination and creativity, leading works in the area suggest that material and energy efficiencies could be increased by a factor of four or even ten, without much strain on existing technological and administrative capacities. Important policy changes (e.g. in tax regimes) would be required to change incentive structures and draw attention to opportunities for efficiency gains. Advocates nevertheless hold that no great change in the dominant capitalist form would be needed.

Critics have pointed to two main difficulties – that efficiency solutions are often the retreat of those unwilling to face more politically challenging inequities, and that efficiency gains are of no great value without changes to ensure the savings do not merely go to more consumption.[15] If savings in one area merely facilitate more material or energy consumption elsewhere, there is no net gain. If the savings go into more consumption by the already affluent, prospects for sustainability are likely to decline.

These criticisms have merit. Efficiency gains cannot be sufficient by themselves. And they will provide net reductions in overall material and energy use only if tied into broader efforts to de-couple well-being and consumption – that is, to show how improvement of human well-being can be achieved at the same time as reductions in material and energy consumption.

It remains that substantial efficiency improvements are possible and necessary as part of the sustainability agenda. But initiatives to reduce material and energy throughput will be beneficial only if designed and implemented in comprehensive approaches that seek overall gains and consider the distribution of benefits.

[15] See, for example Mary Jane Patterson, "Natural Capitalism," *New Internationalist* 329 (November 2000), pp.14-15.

Democracy and civility

Build our capacity to apply sustainability principles through a better informed and better integrated package of administrative, market, customary and personal decision making practices.

Better governance is a prerequisite and probably also a product of steps towards sustainability. Sustainability demands better understanding of complex, intertwined and dynamic conditions – social and ecological. It requires us to be more thoughtful, open and flexible, able to examine our capacities and objectives in a more integrated way, with more humility, more far-sightedness, and more commitment to continuous learning and adjustment.

This is not entirely, and perhaps not even chiefly, a matter of government and administration as usually conceived. The sustainability principles outlined above have implications for the whole set of social-economic and ecological relationships. Authoritative government is just one means of maintaining and adjusting these relations. The three other main ones are market mechanisms, customary practice and individual choice.

For each of these options there is a more or less extensive body of theory and practice. Over the past three or four decades, most official weight has been placed on the needed design and exercise of government authority through laws, policies and programmes from site-specific emission limits to global accords. Recent administrative theories and initiatives have tended to focus also on more effective use of market mechanisms, emphasizing more sophisticated responses to existing economic incentives (through environmental management systems and other "voluntary" measures) and adoption of new or adjusted tools (emission and carbon trading schemes, ecological tax reform, etc.) to make the market more sensitive to its social and ecological context.

Some of the most effective economic actions, however, have centred on consumer mobilization (e.g. against purchase of blood diamonds, genetically modified foods, tropical hardwoods and old growth lumber) based on informed, personal moral choice. Work related to personal moral choice (ethics, education, spirituality, etc.) represents another large field of discussion and application that is, effectively, about governance. Finally, there is the package of key concerns, in especially in urban and rural planning and in international development literature and practice, that includes focus on community, local culture, traditional knowledge systems, customary civility and informed social and ecological commitment to home place.

Arguably these latter are the most neglected but most crucial governance means of building and preserving sustainability gains. Education and equitable empowerment at the community level in ways that are respectful of local knowledge and other assets have been demonstrably effective means of enhancing individual and collective well-being. This suggests a consequent need to strengthen individual and collective understanding of ecology and community, to foster customary civility and ecological responsibility, and to build civil capacity for effective involvement in collective decision making.

But it is not easy to draw a tidy set of sustainability principles from these considerations. All four aspects of governance are important and interrelated. However, sustainability objectives are not automatically well served by any of them. The many failings of conventional administrative and market decisions are well documented. Both individual moral choices and customary practices can be socially and ecologically destructive. Moreover, the interrelationships can breed conflicts (e.g. where market pricing ignores social and ecological damages and confounds informed personal choice) as well as be mutually supporting (e.g. where authorities require attention to traditional knowledge).

Better governance for sustainability, and the underlying capabilities for such governance, must be carefully and gradually reconstructed, recognizing the complexities not just of administration, markets, traditions and choices, but also of their interrelations. In addition, what is most needed, appropriate and workable always depends heavily on the context. Some argue that what is true and desirable is entirely a matter of specific context. While this position is debatable, it does point usefully to the long and largely sorry history of impositions that lies behind much of what is now unsustainable. Recognizing the importance of context is also consistent with the principles of ecological integrity and equity. In any event, there are many different ways of designing and strengthening the various foundations and practices of governance to respect the principles of sustainability and respect for context is a reasonable basis for choosing among the options.

Accepting the importance of context makes is difficult to identify general rules for applying the governance, civility and commitment principle. But it is at least useful to recognize the importance of the several means of governance and their interrelations, to give explicit attention to finding the most crucial and promising ways of building capacity with due respect for the objectives of ecology, efficiency and equity and the importance of specific context.

Precaution

Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, design for surprise and manage for adaptation.

The principles above are generic, meant for universal application in, for example, environmental assessments of many kinds of undertakings, affecting many different communities and ecosystems. They are drawn from and reflect broad agreement in a wide base of literature and some practice. At the same time they are imprecise and proposed tentatively. This is in part because there are many different ways to integrate and categorize the underlying considerations and points of agreement. But the fuzziness and hesitation also reflect the continuing weakness of our understanding about how it all works.

Experience in environmental assessment and in all other fields consistently confirms that the biophysical and socio-economic world is highly complex. Confident understanding and reliable prediction are possible only in certain narrowly defined areas and circumstances, which may often be important but do not tell us enough of what we need to know for planning and decision making on many undertakings.

A key implication of this is a favouring of precautionary approaches. The 1992 Rio Declaration, which Canada has signed, states that the precautionary approach requires that "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." More broadly, precaution involves willingness to act on incomplete but suggestive information where social and ecological systems that are crucial for sustainability are at risk.

But this is only part of the story. We will be surprised by unanticipated effects. Because of the complexities and uncertainties that underlie the precautionary approach, we are unlikely to have even suggestive evidence about many emerging problems, much less the resulting effects that ripple unpredictably through complex socio-ecological systems. Moreover, there will be serious problems that we do anticipate and cannot (or do not) prevent. Global climate change is unlikely to be alone in this category. Prudence therefore also entails selecting, designing and managing for adaptation. This includes favouring diversity, flexibility and reversibility,

preferring safe fail over fail-safe technologies, seeking broadly comprehensible options rather than those that are dependent on specialized expertise, ensuring the availability and practicality of backup alternatives, and establishing mechanisms for effective monitoring and response.

Immediate and long term integration

Apply all principles of sustainability at once, seeking mutually supportive benefits.

As discussed above, the prevailing view in the sustainability literature about pillars is that what happens in any one area is closely linked with what happens in all of the others. This is no less true for the somewhat different list of requirements above. Because of these linkages and interdependencies, positive steps in all areas are required, at least in general and in the long term. Because there is no route to the long term except through the short, there is good reason to resist convenient immediate compromises unless they clearly promise an eventual gain. And because of the linkages and interdependencies, it is reasonable to expect that positive steps in different areas will often (though not always) be mutually reinforcing.

The key concept here is integration, in contrast to balancing. Ill-considered discussions of sustainability applications often refer to balancing of conservation and development, or human and ecological imperatives. But balancing suggests sacrifices, perhaps on both sides. Often enough, the balancing involves some further loss of ecosystem integrity "balanced" by some restriction in immediate extractive gain. The result is net ecological loss. As a continuing strategy this is not viable. Nor would balancing be acceptable within the framework sketched out here. For example, there would seem to be little long term promise in a balancing strategy that accepted some further incremental widening of the gap between rich and poor on the grounds that it was softened by some equity-related restrictions in trade liberalization deals meant to serve wealth generation and efficiency goals. If both efficiency and equity are necessary for sustainability, then positive gains in both areas must be achieved.

More generally, if greater efficiency, equity, ecological integrity and civility are all necessary for sustainability, then positive gains in all areas must be achieved. And it is not just that each of these areas is crucial. They are linked. What happens in one area affects what happens in the others.

It is not necessarily the case that positive moves in one area will foster positive moves in the others. Because we are dealing with complex, dynamic systems, there are likely to be counter-intuitive and perverse higher order consequences as well as positive feedback loops and mutually supporting gains. But considerable case evidence points to the importance of mutually supporting gains and the likelihood that a failure in one area will undermine success in another. Integrated application of sustainability principles and simultaneous reconciliation of sustainability objectives in immediate efforts is a key to substantial overall progress towards sustainability in the long run.

Characteristics and Limitations of the Principles

As noted above, these seven principles are meant to express the key changes needed generally in any potentially successful strategies for progress towards sustainability. The principles are not profoundly different from what has been presented in more conventional pillar-based approaches; they cover the main substance of key ecological, social, economic and other considerations. But the categorization and phrasing depart from the pillar conventions to stress interconnections and interdependencies among the pillar areas. Moreover, the thinking draws from sustainability-related

discourses not always incorporated in pillar-based sustainability literature and practice. While the result may not cover all significant considerations, and the taxonomy is certainly debatable, the principles set out the main elements and interconnections of what is needed.

The list of principles has four important limitations:

- The principles are only generally stated. Further elaboration and specification of their implications is needed for practical applications.
- The package demands more sophistication than we normally demonstrate. While may live in a real world of complex systems, our brains are small, our time and resources for research constrained, and our institutional capacities limited.
- In the real world, compromises and trade-offs are rarely avoidable. The principle of integration and simultaneous reconciliation may be reasonable in theory, but demanding positive results in all categories seems overly ambitious when so much of what we now do, and regularly propose, satisfies none of the principles.
- No list of principles can be more than a part of the solution. Context may not be everything but it is always crucial. This implies that the design of decision-making processes to respect the specifics of context will be at least as important as the principles outlining the general requirements for sustainability.

Each of these will have to be addressed in practical applications of the principles, including applications in the design and implementation of environmental assessment.

Chapter 3: Sustainability in Environmental Assessment

Environmental Assessment

Environmental assessment is a way of fostering better decision making. Even when its formal role is advisory, it offers a better way of understanding options and making decisions. This has become more obvious as the character and scope of assessment work and applications have expanded.

From the beginning, environmental assessment requirements in various forms were meant to encourage or force serious attention to otherwise neglected environmental considerations in planning and decision-making processes. Prevailing decision making on undertakings of almost all kinds, public and private, typically considered only financial, technical and perhaps political factors. Environmental assessment, as a preventative approach to environmentally regrettable undertakings, was seen as a means of expanding the list of considerations.

These initial objectives have not changed much and have nowhere been fully realized. But over the last thirty years environmental assessment in Canada and elsewhere has evolved to do a better job. In particular, processes have moved towards being:

- earlier in planning (beginning with purposes and broad alternatives);
- more participative (involving not just proponents, government officials and technical experts but also affected and concerned citizens, citizen organizations and other stakeholders);
- more comprehensive (covering the social, economic and cultural as well as biophysical environment, distant as well as local effects, cumulative as well as immediate effects, positive as well as negative effects, and strategic as well as project level undertakings);
- more integrative (considering systemic effects rather than just individual impacts);
- more cautious (recognizing and addressing uncertainties, applying the precautionary principle); and
- more demanding (seeking most desirable alternatives rather than just individually "acceptable" undertakings).

Not all of these qualities are incorporated in all assessment processes. Some jurisdictions cling to the old narrow path and many have so far accepted only some of the expansions. No jurisdiction that we have reviewed has an environmental assessment regime with all of these characteristics (see Background Paper #2). But the trend is evident in evolution of environmental assessment practices as well as in the concerns addressed in the literature. And similar process innovations are occurring simultaneously in a host of related fields. Some of the most ambitious efforts have been in urban and regional planning – in multistakeholder visioning exercises, ecosystem-based planning, development of growth management strategies, site-specific urban renewal design, etc. (see Background Paper #1).

Adoption of sustainability-based decision criteria for environmental assessments is occurring in this broader context. It will be affected by and will, in turn, influence these other changes.

Implications of a Shift to Sustainability-based Criteria

In most jurisdictions, the essential immediate effect of a shift to sustainability-based criteria is an expansion of central concern from avoidance of significant adverse effects to expectation of positive contribution to the achievement of sustainability objectives, however vaguely specified.[16] This is why we have devoted so much attention here to identifying the main principles, and why the lack of more specific elaboration of these general principles so far is a serious limitation. But as we have suggested, generic specification of broad principles can only go so far when context is critical.

Incorporating sustainability entails three new or adjusted roles for environmental assessment. Environmental assessment becomes:

- a mechanism for forcing attention to sustainability principles and a means of making positive contributions to achieving sustainability objectives;
- a process for specifying these principles – and associated values, objectives and criteria – in light of the specific context, through informed choices by the relevant parties (stakeholders); and
- a broader process for:
  - identifying appropriate purposes and options for new or continuing undertakings;
  - assessing purposes, options, impacts, mitigation and enhancement possibilities, etc.;
  - choosing (or advising decision makers on) what should (or should not) be approved and done, and under what conditions; and
  - monitoring and learning from the results.

Of these, the easiest is the first. We now have plenty of conventional environmental assessment experience about how to design environmental law and process for effective forcing of serious attention to otherwise neglected considerations. The basic rules for effective process design and application are not difficult to identify.[17] Building willingness to apply these rules is the more daunting challenge.

Specifying and applying sustainability principles in general and in context involves more fundamental problems. The same is true of applying these principles in key decision making on purposes, options, effect evaluations and approvals.

Specifying the Principles for Environmental Assessments

Environmental assessments are not the only vehicles for specifying sustainability principles, objectives and criteria, even for the specific contexts of undertakings subject to assessment requirements. Other processes exist or can be designed to develop such objectives, and associated indicators of process. Indeed, a great deal of excellent work has already been done in this area – in regional and

[16] Some jurisdictions (e.g. Québec) and processes (e.g. the Canadian federal strategic assessment process) already demand some attention to positive effects and enhancements. But typically the actual focus remains on negative effects and their mitigation.

[17] See for example, Barry Sadler, *Environmental assessment in a changing world: evaluating practice to improve performance: Final Report of the International Study of the Effectiveness of Environmental Assessment* (Hull, Quebec: Canadian Environmental Assessment Agency and International Association for Impact Assessment 1996); and Robert B. Gibson. "Environmental assessment design: lessons from the Canadian experience," *The Environmental Professional* 15(1), 1993, pp.12-24.

resource management planning; in sustainability indicator development at the international, national, provincial/territorial, regional and local levels; in government agency-based exercises; in planning and policy development for protected areas of various kinds; and in the elaboration of corporate sustainability principles (see Background Paper #1). There have also been important efforts to consolidate this work, or at least to bring it together in accessible forms.[18]

The work so far also has major limitations:

- Only some regions, sectors and issue areas have been addressed.
- Many different approaches have been used, some of them far from comprehensive of key sustainability considerations.
- Consolidation of available work has been attempted in only a few places.
- While much respected expertise has been mobilized, not all sustainability objectives and indicators initiatives have been undertaken with sufficient openness and breadth of participation to be credible and potentially acceptable to stakeholders in contested cases.
- Many exercises have been limited by preferences and practicalities to fragmented methodologies that have focused on particular problems and relationships within individual sustainability pillar areas. They are consequently not well designed for attention to cross-pillar influences, complex system effects, and successes or failures in meeting objectives related to the principles outlined here.
- Indicators-based approaches to defining, and measuring change towards, sustainability objectives tend to suffer from inadequate or absent baseline data, and from linearity and exposure to predictive limitations.
- Aggregation of findings remains a huge challenge.
- Formal links between environmental assessment and established sustainability objectives, even ones formally adopted by the relevant jurisdiction, are rare.

For practical environmental assessment purposes, especially at the project level, it is usually desirable and often crucial to specify the relevant (i.e. context sensitive) sustainability principles, objectives and criteria as fully and credibly as possible before proponents begin thinking about their purposes and options. This underlines the need for anticipatory work to define sustainability criteria for environmental assessment. Sustainability efforts in environmental assessment should therefore be accompanied by and linked with dedicated work to:

- foster consistent and credible specification of sustainability principles and criteria at all levels from the global to the local;
- develop better integrated, system-sensitive sustainability indicators;
- make more and better use of multistakeholder visioning and scenario-building processes to define context-specific sustainability objectives, depict relevant systems, and map tentative strategies for progress to the chosen futures;
- apply sustainability principles more broadly throughout government and other governance bodies; and
- link environmental assessment processes with similarly open and rigorous processes of objective setting, criteria specification, planning, regulation, monitoring, adaptation and reporting.

[18] Especially notable is the work of the International Institute for Sustainable Development. See http://iisd1.iisd.ca/measure/compindex.asp.

Most, if not all of these steps are also appropriate within environmental assessment regimes that adopt sustainability criteria. As well there are specific measures that would have to be addressed in environmental assessment process design, documentation and procedural development, and implementation. In particular, this would involve:

- ensuring that environmental assessment requirements and process components are consistent with the essential requirements for sustainability assessment (especially that social, economic and cultural and cumulative as well as biophysical effects are covered, that positive as well as negative effects are assessed; that purposes and alternatives are examined; that strategic as well as project level undertakings are included; and that there are provisions for linking strategic and project level assessments);
- using strategic level assessments to clarify sector and area specific sustainability principles, objectives and criteria, and to set out appropriate processes for applying these in the planning, review and approval of relevant projects and activities;
- developing generic and sectoral guidance documents on methodologies for sustainability-focused environmental assessments of various types (at the project or strategic level, in particular sectors or regions/ecosystems, from particular agencies, involving cumulative or transboundary effects, domestic or outside Canada, etc.) and focusing on various particular issues (for example, adoption of sustainability objectives from other processes, design of scenario building and systems depiction exercises, assessment of positive effects and enhancements, and evaluation of adaptive design options);
- specifying how sustainability principles, objectives and criteria are to be developed and applied in generic screenings (e.g. inclusion and exclusion lists) and class or case screenings;
- redesigning processes and procedures to ensure that case specific guidance is prepared and provided to potential proponents before, or at least as, they begin deliberations about their purposes and options;
- introducing measures to ensure transparency and public involvement in the crucial early assessment stages where the sustainability objectives and criteria are set, and policy or project purposes and options selected;
- clarifying decision rules for application of objectives and criteria in the evaluation of effects, options (alternatives), mitigation and enhancement proposals; and overall approvability;
- developing approaches to monitoring implementation of approved undertakings that ensure attention to unanticipated sustainability effects and to focus adaptive management efforts on appropriate mitigations and enhancements; and
- enabling and clarifying the requisite changes through amendments to legislation and policy.

These are substantial lists. And many of the individual items involve challenging tasks. But they are not, on the whole, much different from the lists of matters to address that environmental assessment advocates, administrators and other professionals face today. Moreover, useful progress in the application of sustainability criteria in environmental assessment can be made long before all these are completed.

First, however, the problem of compromises and trade-offs must be addressed.

Applying the Principles in Decision Making

We have outlined here seven key principles of sustainability. Each is crucial and all are to be applied together. Indeed one of the principles underlines this. The principle of immediate and long-term integration requires that we apply all principles of sustainability at once, seeking mutually supportive benefits. In theory, this is entirely reasonable, even obligatory. We need very substantial improvements to avoid the perils of continued unsustainable behaviour. These improvements rely on linked, mutually supporting, positive steps on all fronts. There is no way around this.

In conventional practice, however, most decision making involves compromises and trade-offs. Environmental assessment has been no exception.

The problem of compromises and trade-offs

Arguably, environmental assessment originated as a means of encouraging compromises and trade-offs. Like many environmental policy tools, environmental assessment has generally been viewed as a means of adding environmental considerations into predominantly financial, technical and political decision-making processes, and encouraging some adjustments to the usual objectives in the interests of avoiding serious environmental harm. Environmental and economic ends were assumed to conflict. Environmental protection cost money; attending to environmental concerns was an economic sacrifice.

A great body of "pollution prevention pays" literature has documented that this assumption is often false. Even within the narrow economic interests of individual firms, ecological and economic interests are much more likely to coincide than is commonly recognized. Some argue that commitment to environmental responsibility is a good indicator of corporate economic prospects. But that said, social and ecological improvements do often involve at least immediate costs and the benefits may be distant and distributed beyond the initial investors.[19]

At the level of the firm, under current pricing and incentive structures, compromise and trade-offs appear to be unavoidable. The same is no doubt true at the level of the industry sector. Firms in a sector can collectively recognize a shared interest in making substantial voluntary improvements in their environmental performance. The chemical sector's Responsible Care initiative is a good example[20]. But such behaviour is atypical, and may remain so, at least until pricing and incentive structures (e.g. tax regimes) are adjusted to reduce conflict with sustainability objectives.

At the level of public interest, the unavoidability of serious compromise and trade-off is not so clear.

In environmental assessment practice, an assumed conflict between environmental and other objectives is commonly built into process design. In the Canadian federal process, for example, significant adverse environmental effects may be "justified in the circumstances." These circumstances are not defined, but in practice the circumstance of anticipated revenue and employment benefits has been used to justify acceptance of significant adverse

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[19] See, for example, the contrasting views in papers by Porter and van der Linde, and Walley and Whitehead, in R. Welford and R. Starkey, editors, *The Earthscan Reader in Business and the Environment* (London: Earthscan, 1996).

[20] See John Moffet and François Bregha, "Responsible Care," in Robert B. Gibson, editor, *Voluntary Initiatives: The New Politics of Corporate Greening* (Peterborough: Broadview, 1999), pp.69-92.

environmental effects.[21] Similar trade-offs are also involved in the more or less separate negotiation of impact and benefit agreements accompanying approvals of many assessed projects affecting Aboriginal communities in the territories, in provisions for compensation, in acceptance of substitutions, in calculations of net effects, and in a host of other practices both within environmental assessment and between environmental assessment conclusions and other considerations in final decision making.

The question is which of these conventional trade-offs and compromises are really unavoidable or otherwise acceptable from a sustainability perspective?

It seems reasonable to be generally hostile to trade-offs and compromises, since they seem likely to conflict with the principle of immediate and long term integration of positive steps toward sustainability. But a sustainability-based argument for favouring trade-offs can be made in some circumstances. The essence of it is that environmental assessment requirements have traditionally given proponents some incentive to mitigate negative environmental effects, but rarely any incentive to design for environmental enhancement. Willingness to permit certain compromises and trade-offs could spur greater willingness to strengthen sustainability-enhancing effects. There are other means of building such incentives, both in environmental assessment (e.g. by requiring consideration of reasonable alternatives and selection of the most desirable) and through other policy initiatives (e.g. ecological tax reform). But acceptance of certain compromises and trade-offs in environmental assessment could be useful as well.

Compromise and trade-offs in assessment for sustainability

For the purposes of the following discussion, we will assume that:

- environmental assessment is the core planning and decision making process;
- the sustainability principles outlined here are accepted; and
- environmental assessment process requirements and design include application at the strategic as well as project level, a broadly inclusive definition of "environment", obligations to consider purposes and alternatives, and other provisions to facilitate careful, open and reasonably comprehensive deliberations.

In assessments under such a regime, proponents and others may propose compromises and trade-offs of various kinds. These could come in an almost infinite variety of forms, which we cannot explore exhaustively here. But the challenges involved can perhaps be illustrated well enough through consideration of possible compromises and trade-offs in two general categories: compensations and net calculations.

Proponents of assessed undertakings often propose direct and indirect compensation for, rather than full mitigation of, negative effects. These can include substitutions in kind, place and time, for example:

- introduction of aggregate mining operations on somewhat degraded agricultural lands and rehabilitation of those lands to superior standards at the end of mining operations in 20 years (substitution in time);
- elimination of a relatively natural wetland and substitution of a constructed wetland elsewhere (substitution in place); and

[21] This was, for example, the situation in the case of the proposed Cheviot coal mining project near Jasper National Park in Alberta.

- provision of new community recreational facilities in a remote village facing risk of ecological damage to traditional hunting and trapping areas (substitution in kind).

Similarly, proponents and other decision makers may wish to use net gain and no net loss calculations in assessing whether a positive contribution to sustainability is likely. In such calculations at least some gains and losses are aggregated and losses balanced against gains. The gains and losses involved may be limited to specific effects concerns (such as those concerning the net effect of the proposed wetland elimination and substitution mentioned above). But they could also be widely distributed in kind, place and time. Examples include:

- reduction of near term ecological damage risks from surface storage of high level radioactive wastes balanced against smaller but very long term risks from deep geological disposal (differences in time);
- major damages to the interests of tribal people displaced by a new dam balanced against more material security for larger numbers of poor farmers downstream (differences in place); and
- efficiency gains from industrial process improvements balanced against associated job losses (substitution in kind).

Even where sustainability objectives are widely understood and commonly accepted, different interests are likely to reach different conclusions about which of these compensations and net calculations may be justified. The answers often also depend on the details. Just how serious are the losses, risks and gains involved? Just how inequitable is the distribution of effects? We wrestle with such questions daily and for formal decision making we have developed elaborate tools (systems analysis, scenario-building, cost-benefit analysis, risk assessment, multistakeholder negotiation, etc.) to assist the process. While all of them are more or less insufficient and problematic (see Background Paper #1), their mere existence testifies to the common need for detailed, context specific deliberation.

How can all this be accommodated in applications of the sustainability principles in environmental assessments? In particular how can this be accommodated in applications of the immediate and long term integration principle?

There seem to be two, interdependent options: rules and processes. Sustainability-based environmental assessment regimes can clarify application of the sustainability principles by setting out some general rules for considering compromises and tradeoffs. And they can provide guidance on selection and use of appropriate processes for making context-specific decisions on matters for which general rules are not suitable or not helpful. Processes for setting the rules, and rules about appropriate context-specific processes, will also be needed.

We are not in a position here to set out a consistent and comprehensive list of potentially acceptable general rules. The following list merely illustrates some of the possibilities:

- Compromises and trade-offs in (all or specified) sustainability-related matters are undesirable unless proven otherwise; the burden of proof falls on the proponent of compromise and trade-off.
- Only undertakings that are likely to provide neutral or positive overall effects in each principle category (e.g. no net efficiency losses, no net additional inequities) can be acceptable.

- No significant adverse effects in any principle category can be justified by compensations of other kinds, or in other places (this would preclude cross-principle trade-offs such as ecological rehabilitation compensations for introduction of significantly greater inequities).
- No displacement of (significant, net, any) negative effects from the present to the future can be justified.
- No enhancement can be accepted as an acceptable trade-off against incomplete mitigation if stronger mitigation efforts are feasible.
- Only compromises or trade-offs leading to substantial net positive long term effects are acceptable.
- No compromises or trade-offs are acceptable if they entail further declines or risks of decline in officially recognized areas of concern (set out in specified official national or other sustainability strategies, plans, etc.).

In effect, the key rule may be that no significant compromises and trade-offs are permitted. This begs the big question of what then qualifies as "significant". We will return to that matter in the next chapter.

Because any conceivably acceptable set of such rules will provide limited guidance, processes for case-, region-, sector- and agency-specific clarifications will be needed. The key considerations here, and in the setting of the general rules, are how the issues are presented, debated and resolved and by whom. There are no easy answers to these questions. However, some central considerations seem clear enough:

- While expertise and technical tools can be very helpful, these are essentially and unavoidably value-laden decisions.
- Open and effective involvement of all stakeholders (those representing sustainability-relevant positions as well as those potentially affected) is necessary.
- Informed clarification of rules about possibly acceptable compromises and trade-offs depends on reasonable agreement on the context-specific sustainability objectives and on reasonable awareness of the relevant conditions and influences (this favours use of scenario-building and system depiction methods).
- Because clarifications are needed to guide the planning of undertakings from the outset, anticipatory processes at the strategic level (though environmental assessment and equivalent planning and other processes) and early deliberations at the project level are desirable.
- Because understandings and possibilities evolve, processes for clarifying objectives and acceptable compromises and trade-offs must be iterative, with tentative positions revisited throughout planning, decision making and implementation.

This is at best a preliminary and suggestive discussion. It does indicate, however, that while adopting sustainability-based criteria for environmental assessment opens up a host of new challenges and opportunities, many of them involve familiar themes and merely add to the imperatives for taking steps that ought to have been taken long ago for other good reasons.

Chapter 4: Sustainability and Significance in Environmental Assessment

We have so far mostly avoided using the term "significance" in the discussion of sustainability implications. Nonetheless, the concept will have a major role in sustainability-based environmental assessment.

Practical application of sustainability-based criteria in environmental assessment demands at least some systematic attention to sustainability objectives in decision making at many points and on many specific matters throughout the environmental assessment process. A short list of the main process components is presented in Table 1, below. At each point, we will need to clarify the criteria and their implications for general use and for specific contexts, using open and participative processes. And at each point, judgements about what is important enough to warrant special attention – what is "significant" – will be involved.

In practice, this will not be a simple process of first specifying sustainability criteria and objectives and then making judgements about what is and is not significant. Deliberations about significance will also inform thinking about the criteria and objectives. Indeed, one of the best ways to clarify sustainability-based criteria and their implications may be to focus discussions on significance questions.

The role for significance judgements is greatly enhanced in environmental assessment processes that aim to serve sustainability more effectively. Commitment to sustainability objectives entails attention to a wider and more complex set of considerations than is now common in most environmental assessment regimes. In sustainability-based assessments, significance judgements must be applied to positive as well as negative effects, enhancements as well as mitigations, uncertainties as well as confident predictions, and systemic as well as particular interrelations among long and short term ecological, socio-economic, cultural, and other factors.

This only part of the story, however. As we have argued above, the key issues in sustainability assessments are likely to centre on the matter of compromises and trade-offs, which are undesirable in theory but often unavoidable in practice. A major and largely new role for significance judgements in sustainability assessments will be in the evaluation of compromises and trade-offs.

Significance Applications and Challenges

As documented in Background Paper #3, significance has been a subject of practical interest and professional inquiry throughout the history of environmental assessment. Most attention has focused on the significance of effects and the associated potential significance of undertakings. But significance issues are at least implicitly involved in most aspects of environmental assessment – from initial process design to final rehabilitation of sites when assessed and implemented undertakings are done. The list set out below in Table 1 is probably not entirely comprehensive. It does, however, indicate the range of environmental assessment choices that involve judgements about significance.

Table 1: Components of environmental assessment process design and implementation that should involve sustainability-based significance considerations

Process design

Setting legislated purposes

Specifying process components

- scope of application
- scope of considerations
- assessment streams (provisions for more and less demanding assessments)
- provisions for public involvement
- provisions for guidance (regulations, policies, guidelines, completed strategic level assessments, related plans, etc.)
- provisions for enforcable obligations

Rules of application

Generic screening

- exclusion/inclusion lists
- provisions for application to strategic level undertakings

Generic allocation to assessment streams

- class review/enhanced screening/comprehensive study/public hearings

Case specific screening

Planning and assessment of proposed undertakings

Determining case specific purposes, needs

Identifying potentially reasonable alternatives

Study design

- identification of relevant context and related opportunities, expectations, needs, constraints
- potential concerns/effects, uncertainties
- scoping (boundary setting, focusing)

Evaluation of predicted effects

- before/after mitigation or enhancement
- direct and indirect individual effects/systemic effects/cumulative effects
- immediate and long term effects
- reversible/irreversible effects
- uncertainties

Overall comparison of alternatives, selection of preferred alternative

- integration and evaluation of effects predictions and uncertainties
- comparative evaluation of advantages and disadvantages

Detailed design of preferred alternative

- specific mitigation and enhancement measures

Overall evaluation

- sustainability assessment

Approvals and implementation
Determining acceptability/approval terms and conditions
Setting monitoring and adaptation requirements
- effects monitoring needs/priorities
- compliance monitoring
- adaptive management systems
- rehabilitation obligations

Implementation practice
- response to unanticipated effects, problems and opportunities
- continuous improvement
- evaluation/documentation of lessons

Significance is involved because at every point in this list there is too much to do. There are too many undertakings, too many possible alternatives, too many possible effects, too many options for mitigation, enhancement and adaptation. Not all of them can be addressed, at least not thoroughly. Priorities must be set. Significance in this context is simply the key criterion for priority setting. It is not the only criterion – often other factors such as affordability and technical feasibility must also be considered. But it is always desirable to focus attention on what is most important.

The challenges lie in defining "significance" clearly and defensibly for each point in the process. For environmental assessment administrators, proponents and other participants, it would be convenient to have specific pre-set priority lists or guidelines for determining significance and priority at each major decision point. It would be most convenient to have significance benchmarks – clear dividing lines between what is and what is not significant. Unfortunately, there are many inconvenient complexities to address.

Many jurisdictions have attempted to provide significance interpretations for application at various points in the process – especially for screening and effects evaluation. There is useful literature and official guidance, at least in some jurisdictions, on factors to be considered in the determination of significance thresholds. And there is some good work on methods and processes for certain significance determinations and applications, for example in identifying especially sensitive environmental components and in ranking and weighting criteria in alternatives analysis.

But few significance elaborations and thresholds have been developed with sustainability criteria in mind. Often this is because the relevant assessment processes focus narrowly on only some relevant considerations – usually direct negative ecological effects. In other cases, a broad enough basic agenda may be in place but explicit sustainability-based criteria have not been specified. Consequently, significance decisions have been made in the absence of any clear grasp of the purposes to be served.

Applying sustainability-based criteria will bring a different set of considerations into judgements about significance, and into the development of significance guidelines and thresholds. It is well beyond the ambitions of this paper to outline how the seven sustainability principles should affect assessment design and practice, including significance judgements, for each of the Table 1 components. In the discussion below we will simply sketch out some of the main considerations in three areas: significance of effects, significance of undertakings, and significance of compromises and trade-offs.

Applying Sustainability-based Criteria in Significance Judgements

Adopting a sustainability-based approach to environmental assessment entails recognizing the full range of broadly "environmental" effects, positive and negative. As well it entails aiming not just to avoid serious adverse effects but to identify the most positive ways of meeting sustainability criteria. This is more ambitious than environmental assessment as usually practiced. But much of the shift can be achieved simply by building on current approaches. This seems to be true generally in the application of expanded significance criteria.

Significance and sustainability in effects evaluation

Table 1 above suggests that the first environmental assessment and significance issues lie in process design. While this is true in the logical chronology of assessment design and application, the central underlying issue is how to improve decision making – how to ensure the relevant authorities gain and apply a better appreciation of the potential effects of the available options. It therefore makes sense to begin by considering the significance of effects.

We have had decades of experience with efforts to define the significance of environmental effects. David Lawrence's review of the substantial literature and lessons from practice in Background Paper #3 indicates that practitioners have developed detailed significance criteria, benchmarks and checklists for a wide range of parameters: purposes, environmental components, proposal types, sectors and technologies, regions and sites, regulatory contexts, etc. It is possible nonetheless to identify generic significance criteria and to consider how these might be adjusted and supplemented to ensure adequate incorporation of sustainability considerations.

Table 2 presents a list of generic criteria for evaluating the significance of effects. The list, drawn from material in Background Paper #3,[22] is not meant to be comprehensive. Moreover, in the literature many of the listed considerations are supported by clarifications and elaborations, for example with indicators of potential threats to certain kinds of sensitive ecosystems, criteria for judging riskiness, and means of judging the potential adequacy of mitigation measures. Still, the Table 2 list indicates the range and substance of the main significance considerations in current environmental assessment literature. Note that the criteria can be applied to individual effects or to sets of effects. Most could also be used in evaluation of the overall significance of a proposed undertaking's positive and negative effects.

Table 2: Generic criteria for evaluating the significance of effects

1. Are the effects permanent or irreversible?
2. Are the receptors highly sensitive, potentially unstable or at the limits of their resilience?
3. Are the receptors highly valued?
4. Is the intensity, magnitude, scale, extent, duration or frequency of the effects great?
5. Are there potentially severe human health and/or ecological risks?
6. Are the resources or features to be affected rare, scarce or unique?
7. Is there a high level of public controversy?
8. Are substantial cumulative effects likely?

[22] See Background Paper #3, sections 4.3 and 4.4.

9. Are existing environmental quality standards likely to be contravened?
10. Will the effects conflict with the intent of public policies, plans, programmes, guidelines, criteria or objectives?
11. Are transboundary effects likely?
12. Will assimilative or carrying capacity be jeopardized?
13. Is a high level of resource or energy consumption or waste generation involved?
14. Are major inequities in the distribution of effects likely?
15. Are the anticipated effects likely?
16. Are there important uncertainties about the effects and their context?
17. Is the context complex and are unanticipated indirect effects likely?
18. May important precedents be set?
19. Can the adverse aspects be substantially mitigated?

For comparison and integration, Table 3 outlines sustainability-based criteria directly related to the seven principles identified in this paper. Each of these considerations needs clarification and elaboration – for example with indicators of potential threats to ecological integrity, key elements of material security equity, and characteristics of adaptive design. The generic list nevertheless indicates the nature of the broad considerations involved.

Table 3: Generic sustainability-based criteria for evaluating the significance of effects

1. Could the effects add to stresses that might undermine ecological integrity at any scale, in ways or to an extent that could damage important life support functions?
2. Could the effects contribute substantially to ecological rehabilitation and/or otherwise reduce stresses that might otherwise undermine ecological integrity at any scale?
3. Could the effects provide more economic opportunities for human well-being while reducing material and energy demands and other stresses on socio-ecological systems?
4. Could the effects reduce economic opportunities for human well-being and/or increase material and energy demands and other stresses on socio-ecological systems?
5. Could the effects increase equity in the provision material security and effective choices, including future as well as present generations?
6. Could the effects reduce equity in the provision material security and effective choices, including future as well as present generations?
7. Could the effects build government, corporate and public incentives and capacities to apply sustainability principles?
8. Could the effects undermine government, corporate or public incentives and capacities to apply sustainability principles?

9. Could the effects contribute to serious or irreversible damage to any of the foundations for sustainability?
10. Are the relevant aspects of the undertaking designed for adaptation (e.g. through replacement) if unanticipated adverse effects emerge?
11. Could the effects contribute positively to several or all aspects of sustainability in a mutually supportive way?
12. Could the effects in any aspect of sustainability have consequences that might undermine prospects for improvement in another?

The sustainability-based criteria in Table 3 do not introduce entirely new factors. Aspects of most of them are addressed by items in Table 2 and have been considered at least to some extent, and at least indirectly, in past assessments. This is particularly true of uncertainty, equity and consumption/waste considerations. But direct and explicit attention to sustainability based-criteria will change how significance evaluations are done and affect the resulting judgements.

Significance and sustainability in decisions on process application

All undertakings, or sets of undertakings, that may have significant implications for sustainability should be subject to assessment. But not all possibly relevant undertakings, effects and alternatives can be covered, at least not very thoroughly. Conventional means of addressing this problem include provisions for exemption of minor undertakings, provisions establishing more and less rigorous streams of assessment (e.g. basic screening, class review, more comprehensive study, full public hearing), and provisions for case specific scoping (boundary setting and focusing). Significance judgements are central in all of these matters.

Defining significance for the purposes of allocating certain types of undertaking to more and less demanding assessment streams is superficially simple: take the seven sustainability criteria and assign greatest significance to the types of undertaking that are most likely to benefit from assessment because:

- they seem most likely to threaten progress on one or more aspect of sustainability recognized in the criteria;
- they or their potential effects seem most likely to combine with those of other undertakings to threaten progress on one or more of the aspects of sustainability recognized in the criteria;
- careful attention to purposes and alternative approaches seems most likely to reveal much less risky or damaging and/or much more beneficial options; and
- careful attention to the broadly environmental context seems most likely to reveal mitigation and enhancement possibilities, or adaptive design elements that would make the undertaking much less risky or damaging and/or much more beneficial.

Similarly, least significance would be assigned to those types of undertaking that are:

- most likely to have trivial or modestly beneficial effects on sustainability;
- clearly the best (or least bad) of potentially available options;
- least likely to have unanticipated effects influencing some aspect of sustainability; and
- already well designed to be reversible or otherwise adaptive to surprise.

More detailed deliberations would take into consideration somewhat more specific criteria, for example ones addressing detailed versions of the significance of effects criteria set out in Tables 2 and 3. This would also entail attention to the contexts of the undertakings involved. Simply examining "types of undertaking" without attention to their specific ecological and socio-economic contexts is likely to miss some of the most important factors affecting significance. And examining types of individual undertakings neglects the potential collective significance of undertakings that are individually inconsequential.

Even without these details, however, applying sustainability-based significance criteria in process application decisions would entail some adjustments to the conventional approaches taken in most jurisdictions. The extent of these adjustments would depend mostly the breadth of considerations now applied.

For example, a key initial question is how central ecological concerns should be in deciding what types of undertaking should be subject to assessment requirements. In many assessment regimes, the potential significance of ecological effects is the primary criterion in these decisions. Where the more comprehensive sustainability-based criteria are adopted, ecological considerations remain important – they are relevant to all of the criteria and central in the integrity, efficiency and precautionary ones. But assessments could be triggered in cases where the main immediate concerns are social.

Such use of more comprehensive criteria in process application decisions is common now in the assessment processes of development agencies such as the World Bank. It is also anticipated in some new processes, such as the Development Assessment Process now being designed under the terms of the Yukon First Nations Umbrella Final Agreement.[23] Older national and provincial regimes could, as an interim measure, continue to use ecological significance as a necessary criterion in basic process application decisions – i.e. only undertakings with some potential ecological significance would be assessed – but use the full set of sustainability criteria in other significance judgements, such as concerning the appropriate assessment stream for various types of undertakings.

A final broad point about significance in process application decisions concerns the relative weighting of strategic versus project-level assessments. Greater attention to strategic level assessment is already widely advocated for process efficiency and other reasons not directly tied to sustainability objectives.[24] Serious application of sustainability criteria adds to these arguments. Comprehensive and integrated consideration of systemic effects and broad alternatives is typically easier and more timely in assessments of policies, programmes and plans than in project level assessments. As a result, significant sustainability gains (and avoidance of significant sustainability losses) can be considerably greater at the strategic level. In many jurisdictions, the main authorities responsible for policies, programmes and plans that are significant from a sustainability perspective are inclined to resist mandatory and open strategic assessment. However, these authorities have typically also expressed commitment to sustainability.

[23] See *Comprehensive Land Claim Umbrella Final Agreement between the Government of Canada, The Council for Yukon Indians and the Government of the Yukon*, 31 March 1990, chapter 12.

[24] See, for example, Maria Rosário Partidário and Ray Clarke, eds. (2000), *Perspectives on Strategic Environmental Assessment* Boca Raton: Lewis Publishers.

In the near term, the best practical openings for immediate application of sustainability criteria in significance decisions probably lie in assessments of major undertakings already subject to current environmental assessment requirements. As noted at the beginning of this paper, sustainability-based criteria have been adopted by recent federal hearing panels and imposed by a court decision on a controversial case subject to the British Columbia assessment process. For such cases, determining how to apply sustainability criteria – in study design, effects evaluation, alternatives selection, approval decisions and adjustments during the project implementation – is a recognized present challenge. Significance judgements are involved in all these matters but perhaps the most difficult ones will be those in approval decision making when difficult compromise and trade-off issues arise.

Significance and sustainability in decisions on compromise and trade offs

As we have seen above, sustainability-based assessment should favour efforts by proponents and assessors to design projects that promise positive contributions to all aspects of sustainability. The immediate and long term integration principle suggests that we should discourage or refuse trade-offs. Inevitably, however, many trade-offs will be proposed.

Some trade-offs will be unavoidable. For example, in some cases of undertakings that respond to major existing problems – such as treatment and/or disposal of existing stocks of highly toxic waste – we may be looking for "least bad" solutions and find that none of the available options can be entirely positive. Also, some trade-offs may be desirable. For example, short term reliance on non-renewable resources may in some cases provide a valuable bridge to development of renewable systems that are sustainable over the long haul. As well, allowing some trade-offs might add to incentives for positive improvements such as by encouraging proponents to strengthen ecological enhancements as a proposed compensation for incomplete mitigation. In determining whether specific proposed undertakings are acceptable, there will be a need for judgements not only about what effects are significant, positively or negatively, but also about what compromises and trade-offs are significant.

Again as we have seen, only some guidance for such significance judgements can come from generic sources. Clarification of sustainability objectives and implications at various levels will help. But much will also depend on context-specific possibilities and local aspirations. Determining significance of trade-offs, or at least developing a supportable basis for such determinations, is best considered as a matter of public choice, closely associated with deliberations about current conditions and possibilities, desired sustainable futures, and ways of getting from here to there. Approaching significance evaluations and decisions in this way can incorporate, but also goes well beyond the useful work done on significance applications so far.

That said, some general criteria can be developed for significance evaluations of elements on both the positive and adverse sides of proposed trade-offs. An illustrative list is provided in Table 4.

Table 4: Generic criteria for evaluating the significance of trade-off elements

Will the positive effects to be gained in a proposed trade-off:

- reduce stresses on ecological integrity at any scale;
- increase economic opportunities for human well-being;
- reduce material and energy demands and other stresses on socio-ecological systems;
- increase equity in the distribution of material security and effective choices;
- strengthen government, corporate and/or public incentives and capacities to apply sustainability principles; and/or
- develop complementary efforts to serve different aspects of sustainability;

in ways that:

- are or may be great in intensity, magnitude, scale, extent, duration or frequency;
- are or may be permanent and irreversible (or at least sustainable for the foreseeable future);
- preserve or enhance highly valued ecological or socio-economic qualities;
- may combine with the effects of other undertakings for more positive cumulative results;
- avoid potentially dangerous uncertainties and prepare for surprise;
- earn a high level of public approval;
- encourage performance beyond levels anticipated in regulatory standards and/or public policies;
- enhance international relations; and/or
- set important precedents.

Might the adverse effects to be accepted in a proposed trade-off:

- damage ecological integrity at any scale in ways or to an extent that could damage important life support functions;
- reduce economic opportunities for human well-being;
- increase material and energy demands and other stresses on socio-ecological systems;
- reduce equity in the distribution of material security and effective choices;
- involve or introduce important uncertainties and/or risks;
- undermine government, corporate or public incentives and capacities to apply sustainability principles;
- build tensions between efforts to serve different aspects of sustainability;

in ways that:

- are or may be severe in intensity, magnitude, scale, extent, duration or frequency;
- are or may be permanent or irreversible;
- involve rare, scarce, unique or otherwise highly valued ecological or socio-economic qualities;
- may combine with the effects of other undertakings for more adverse cumulative results;
- have indirect adverse effects that may also undermine prospects for improvement in another aspect of sustainability;
- stir a high level of public controversy;
- contravene important regulatory standards and/or public policy positions;
- damage international relations; and/or
- set important precedents.

For clarity and consistency of application, such criteria for evaluating positive and adverse components of proposed trade-offs would have to be supplemented by rules for deciding what kinds of trade-offs would be generally acceptable and what kinds would be generally unacceptable. In the illustrative list of possible rules set out in the previous chapter, one suggested key rule would allow modest trade-offs and prohibit significant ones. Significance considerations, interpreted in light of the considerations set out in Table 4, could support application of rules against significant trade-offs with adverse sustainability effects, including significant compromises to any of the principles (see Table 5, point #2).

Trade-offs are common, and probably typical, when authorities make final approval decisions on undertakings that have been subject to environmental assessment. Sometimes these decisions are made within the environmental assessment process; more often assessment conclusions are recommendations to decision makers who may also take other considerations into account. Especially in the latter case, the actual decision rules may be invisible or arbitrary.

Setting explicit decision rules on trade-offs and approvals would generally enhance the transparency of decision making and the accountability of decision makers. The *Canadian Environmental Assessment Act*, for example, now allows for approval of assessed projects with significant adverse environmental effects where the decision authorities judge the effects to be "justifiable in the circumstances." The phrase is not defined in the Act and has generally been treated as a matter of Cabinet discretion. Given the purposes of the law, however, it would be reasonable to interpret "justifiable in the circumstances" in light of sustainability criteria and well-considered trade-off significance judgements.

Table 5 presents a list of possible decision rules for approvals involving trade-offs. It incorporates the general trade-off decision rules suggested in Chapter 3 and the significance-based considerations outlined above. This is a tentative list is provided only to indicate the nature of the possibilities. But some such set of decision rules seems necessary and this one may provide a useful basis for initial discussion.

Table 5: Trade-off decision rules incorporating significance considerations (a tentative and illustrative list)

1. Trade-offs in (all or specified) sustainability-related matters are undesirable unless proven otherwise; in other words the burden of proof falls on the proponent of the trade-off.
2. No significant trade-offs with adverse sustainability effects are acceptable. These include:
   - trade-offs of permanent losses against temporary gains;
   - trade-offs of nearly certain losses against highly uncertain gains;
   - significant compromises to ecological integrity;
   - significant increases in inequity of opportunity and influence;
   - significant increases in energy and material flows, except where the gains address serious deprivation and inequity;
   - trade-offs where the adverse effects are uncertain and the undertaking is not designed for adaptive response; and
   - trade-offs where more than one aspect of sustainability may suffer adverse effects.

3. Only undertakings that are likely to provide neutral or positive overall effects in each principle category (e.g. no net efficiency losses, no net additional inequities) can be acceptable.
4. No significant adverse effects in any principle category can be justified by compensations of other kinds, or in other places (this would preclude cross-principle trade-offs such as ecological rehabilitation compensations for introduction of significantly greater inequities).
5. No displacement of (significant, net, any) negative effects from the present to the future can be justified.
6. No enhancement can be accepted as an acceptable trade-off against incomplete mitigation if stronger mitigation efforts are feasible.
7. Only compromises or trade-offs leading to substantial net positive long term effects are acceptable.
8. No compromises or trade-offs are acceptable if they entail further declines or risks of decline in officially recognized areas of concern (set out in specified official national or other sustainability strategies, plans, etc.).

More work will be needed, not just on this decision rules list, but also on incorporation of sustainability-based considerations in significance decisions throughout the environmental assessment process. On the whole, however, the current significance literature provides a suitable and in some ways strong foundation for more explicit and comprehensive attention to sustainability principles.

Chapter 5: Summary and Conclusions

Sustainability and Significance in Environmental Assessment

Sustainability is a widely accepted objective. There is a huge sustainability literature, a wide variety of sustainability applications and a host of useful tools and methodologies (see Background Paper #1). Nevertheless, the central principles are not well elaborated or applied. This is in part because we are just beginning and in part because seeking sustainability means challenging conventional assumptions and practices. A certain amount of hesitation is to be expected.

In much of the sustainability literature, the concept has been presented as a coming together of human and ecological concerns, or as resting on a set of pillars (most often social, economic and ecological) representing areas of concern often in opposition but requiring reconciliation. In this paper we have attempted to dodge some of the implicit tension by presenting conventional sustainability considerations more directly through attention to seven key principles (see Chapter 2). Table 6 summarizes these principles.

Table 6: General sustainability principles

Integrity
Build human-ecological relations to maintain the integrity of biophysical systems in order to maintain the irreplaceable life support functions upon which human well-being depends.

Sufficiency and opportunity
Ensure that everyone has enough for a decent life and that everyone has opportunity to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity.

Equity
Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor.

Efficiency
Reduce overall material and energy demands and other stresses on socio-ecological systems.

Democracy and civility
Build our capacity to apply sustainability principles through a better informed and better integrated package of administrative, market, customary and personal decision making practices.

Precaution
Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, design for surprise, and manage for adaptation.

Immediate and long term integration
Apply all principles of sustainability at once, seeking mutually supportive benefits.

At the simplest level, adopting sustainability-based criteria in environmental assessment means using environmental assessment as a mechanism for forcing attention to sustainability principles and ensuring positive contributions to achieving sustainability objectives. This entails adjusting environmental assessment processes and practices to force and facilitate application of these principles in the planning and approval of projects, activities, plans, programmes, policies and other undertakings likely to affect prospects for sustainability. Sustainability-based environmental assessment is certainly different from the more common, narrower exercises that typically consider only some aspects of environment and focus chiefly on negative effects. It is more ambitious, more demanding and much more positive. But it is, in important ways, not a huge step from present practice and present capabilities.

The key process design elements of sustainability-focused environmental assessment processes are:

- explicit commitment to sustainability objectives and to application of sustainability-based criteria;
- broad definition of environment or other means of ensuring attention to social, economic, cultural and cumulative as well as individual biophysical effects, and all their systemic interrelations;
- mandatory justification of purpose;
- mandatory evaluation of reasonable alternatives;
- attention to positive as well as negative effects and enhancements as well as mitigations;
- provisions for adaptive design and adaptive implementation of approved undertakings;
- links with other sustainability-defining and applying processes; and
- provisions for transparency and effective public involvement throughout the process.

All of these are already present in various incomplete combinations in existing environmental assessment processes in leading jurisdictions (see Background Paper #2). Putting them all together, consistently or at least compatibly, even just in Canadian jurisdictions, is a daunting but not unrealistic task.

In addition to these process implications, incorporating sustainability entails two further roles for environmental assessment:

- as a process for specifying the general sustainability principles – and associated values, objectives and criteria – for specific contexts, through informed choices by the relevant parties (stakeholders), and more particularly;
- as a process for:
  - identifying appropriate purposes and options for new or continuing undertakings;
  - assessing purposes, options, impacts, mitigation and enhancement possibilities, etc.;
  - choosing (or advising decision makers on) what should (or should not) be approved and done, and under what conditions; and
  - monitoring and learning from the results.

All this would be easier if attempted in the context of a more coherent and comprehensive overall framework for sustainability-based governance. Applying sustainability-based criteria in environmental assessment would be greatly facilitated by the general presence of well-considered sustainability objectives, indicators, priority action areas, etc. at strategic levels from the local to the global and for major ecosystems, sectors and other logical divisions. Even in this there is a

role for environmental assessment – especially through application of strategic environmental assessment requirements that ensure transparency and participative opportunity as well as integrated consideration of sustainability principles. Environmental assessment is, nevertheless, just one mechanism among many for effective application of sustainability principles.

Within the realm of environmental assessment for sustainability there will be a few new challenges. One centres on the matter of compromises and trade-offs. The principle of immediate and long term integration requires that we apply all principles of sustainability at once, seeking mutually supportive benefits. The reasons for insisting upon this arise from the clearly interconnected nature of the improvements sought and the evident need for very substantial improvements to avoid the perils of continued unsustainable behaviour. But ours has been a world of compromises and trade-offs – some of them unavoidable and some probably desirable. What we need is an open and defensible basis for making well reasoned decisions about what trade-offs, and consequently what proposed undertakings, are acceptable. Application of the full set of sustainability principles can help build this defensible basis for approval decisions, but this needs to be complemented by a better understanding of what is most important to pursue or protect. This is where the concept of significance comes in.

In environmental assessment, the concept of significance is applied mostly as a means of setting priorities. It is used to assist judgement about what process design elements are crucial, what undertakings must be assessed and how rigorously, what alternatives should be considered, what effects must be mitigated or enhanced, what proposals can be approved and what implementation obligations must be imposed. There is a sizable literature and record of experience in significance interpretations. As Chapter 4 reveals, the usual parameters cover a wide ground but are substantially enhanced by the addition of considerations derived from the sustainability principles (see Tables 2 and 3).

Sustainability-based significance judgements apply throughout the assessment process, often to specific matters such as the evaluation of individual effects. However, acceptance of sustainability principles, at least the ones proposed here, encourages much more attention to matters of aggregation, including assessment of undertakings at the strategic level, consideration of cumulative and overall effects, and judgements about the significance of proposed compromises and trade-offs.

Perhaps the most important and interesting applications of significance evaluation come in the handling of proposed trade-offs in approval decisions. If environmental assessments are to lead to approval decisions that foster sustainability, the rules governing those decisions must be designed to respect the sustainability principles in a way that is firm but also realistic. This almost certainly means accepting some adverse effects in the anticipation of more important gains, but it must not permit approval of trade-offs that contradict the principles to any significant degree.

Table 5 at the end of chapter 4 presents a tentative list of rules for approval decisions involving trade-offs. The list, which is based on sustainability criteria and incorporates significance considerations, illustrates how sustainability and significance concepts can be used jointly to improve the quality and consistency of environmental assessment decisions. Open adoption of such rules should enhance accountability in environmental assessment decision making. It should also clarify for all participants the expectations of the process, leading to more enlightened thinking and more beneficial undertakings.

There is much yet to be done in clarifying the substance and implications of sustainability principles and in specifying how they may be applied in particular decisions, including significance evaluations, at particular points in the environmental assessment process. Only some of this will properly centred on the development of generic guidelines. Much of the needed clarification can come usefully and legitimately only with appreciation of the specific context and with the participation of the relevant stakeholders.

In this, as in environmental assessment generally, the essential story is gradual accommodation to a world of complexities, interconnections and choices. We have been slowly forced to accept that socio-economic and ecological aspects of environment are too intertwined to be usefully treated as separate areas of concern. We have been similarly forced to recognize that expertise can only help in some ways and that we must apply our values. Adopting sustainability-based criteria is just another step in appreciating the linkages, in strengthening processes for applying values with a better understanding of context and possibilities, and in looking a little further ahead.

Next Steps

The evolution of environmental assessment so far has not followed any rational ideal. The processes that have been adopted are wildly diverse; implementation has often been inconsistent and some of the most admirable advances have come more from accident than intent. No doubt this will continue. The underlying differences of interest, preference and context, complicated by the usual jealousies and suspicions, will frustrate hopes of tidily consistent and nicely coordinated sustainability frameworks. And perhaps such diversity is more valuable than is commonly recognized. Nevertheless, we will outline here a set of general steps to build a somewhat clearer and better integrated approach to adopting sustainability-based criteria in environmental assessment.

This is a large topic and we will not attempt to be comprehensive or detailed. But sooner or later we will need four broad accomplishments:

- explicit and effectively imposed requirements for careful, open attention to sustainability principles in the conception, planning, approval and implementation of all important undertakings at the strategic and project levels, in all jurisdictions;
- strong generic guidance on the relevant sustainability objectives, priorities and criteria, for all the main kinds of undertakings and locations, including clarification of implications for purposes and alternatives, effects evaluation, mitigations and enhancements, acceptable compromises and trade-offs in approval decisions, and means of ensuring continuous improvement through adaptive implementation;
- well developed process guidance for the development of case-specific, contextual frameworks for applying sustainability objectives, priorities and criteria, and understanding their implications for the relevant decisions; and
- a rich collection of well tested methodologies for sustainability deliberations, plus baseline data, indicators, systems depictions and desired future scenarios.

For each there are many possibilities for immediate action. Priorities will likely depend on needs for quick responses to unexpected pressures in current cases, to prepare for high-profile anticipated undertakings and to address other present political imperatives. For example, the Tulsequah Chief case in British Columbia, mentioned at the beginning of this report, has already led to an exercise to define sustainability criteria for that application. Provincial authorities may well find

reason now to prepare earlier general guidance for sustainability assessments of other major undertakings subject to the provincial assessment law. Proponents and other process participants will surely demand such guidance for other cases if it seems that the Tulsequah Chief precedent will have broad application.

Similarly, the Canadian federal government, whose recent panels have introduced sustainability-based criteria in specific guidelines for preparation of environmental impact statements, has reason to prepare broadly anticipatory clarifications for future proponents. In the federal process, panel guidelines come very late in project planning, typically long after most serious decisions on purposes, alternatives and key design features have been made. Earlier guidance clarifying what sustainability means (the principles) and entails (the more specific criteria for evaluations, compromise and trade-off rules, etc.) should be a high priority.

The federal government, following its first five-year review of the *Canadian Environmental Assessment Act*, has now introduced proposed amendments to the law. This could then be an opportune time for revisions to the legislation that would make the process design more consistent with the implications of the sustainability interpretation that the panels have adopted. Sustainability assessment fits uncomfortably with the law's current lack of explicit reference to positive effects, its largely indirect attention to socio-economic and cultural considerations, its vagueness on possible interpretations of "justifiable in the circumstances," and its failure to apply to undertakings at the strategic level.

Short of legislative amendment, clarification through guidance documents and gradually built practical precedents can often accomplish nearly equivalent results. For this, again in the Canadian federal context, two logical points of departure might be preparation of sustainability guidance documents covering major types of undertakings on the Comprehensive Study list, and special focus on sustainability considerations in the design of process specifications for assessment of projects outside Canada. An initiative to set sustainability-based trade-off rules for approval decisions relying on the "justifiable in the circumstances" provisions could also be broadly influential.

A valuable more general project would bring together a range of authorities with sustainability interests and expertise to specifying sustainability principles for assessments and other purposes. Canada is a world centre for such work. Many Canadian bodies – round tables at several levels, research institutes, planning authorities, commissioners' offices, etc. – have both relevant expertise and substantial influence in establishing a broad framework of sustainability understanding and application. Certainly the task would need to be well focused on practical application. But the emerging needs for sustainability guidance in environmental assessments offer a host of very practical applications, from individual projects to national scale decision criteria.

Another task, again well within the experiential capacity of Canadian bodies, is to identify the most appropriate processes and process rules for developing context-specific sustainability objectives and criteria, for assessment of specified types of undertakings and specified locations.

Most of this discussion of next steps has been about clarifications – of assessment law, of decision rules, of expectations for various kinds of undertakings, and so on. There is also an argument for creative vagueness. Ambiguity has been a hallmark of environmental assessment in many jurisdictions (the Canadian government's remarkable *Guidelines Order* is just one example).

Sometimes it has served well, at least as a means of postponing conflict. But perhaps it is now past time for a more explicit and forceful translation of sustainability commitment into sustainability action.

Some established authorities may respond negatively to sustainability-based demands for integration of considerations and across-the-board positive effects, arguing that is not how things work. But the point is that established things are not working. That is why the sustainability idea has emerged. And that is why serious efforts to specify and otherwise facilitate application of sustainability principles, in environmental assessments and elsewhere, are needed now.